A-20-7

Sector B
Wsh Plan

discuss on Monday
w/ GM

look at E&E procedures
used in Dead Creek
sampling. Make sure
same as proposed

MCO 7683586

1. PHOTOGRAPH EACH CORE SAMPLE. WHITE BKGD W/ SCALE, 35mm SLIDES

2. IS ESC EQUIPPED TO DO CA LIST & NECESSARY QA/QC?

3. WHY ASSYMETRIC SAMPLE PATTERN? WHY NOT EVEN SPACING ACROSS CHANNEL BOTTOM

4. ANALYSIS MINIMIZATION PROCEDURES AT EACH BORING SITE

GERAGHTY & MILLER, INC.
Environmental Services

DRAFT

125 East Bethpage Road
Plainview, New York 11803
516 249-7600
FAX 516 249-7610

February 12, 1990

VIA TELECOPIER

Mr. Warren Smull
Monsanto Company
800 N. Lindbergh Blvd.
Mail Code G4WM
St. Louis, MO 63167

Re: Proposal for a Soil Boring Program at Dead Creek, Sector B, Sauget, Illinois (50212NY).

Dear Mr. Smull:

As requested, Geraghty & Miller, Inc. is providing this proposal for an investigation in "Sector B" of Dead Creek. The purpose of the study is to physically and chemically characterize soil conditions and estimate the volume of material above the water table that may be affected by hazardous organic compounds and metals. The data generated from the study will be used to determine the feasibility of excavating the material and disposing of it offsite.

To assess the feasibility of removal, it will be necessary to determine if the material can be disposed offsite in accordance with the USEPA's "land ban" requirements. Physical testing, to determine whether the material is a liquid or solid, and chemical analyses to determine the concentrations of specific compounds are required.

In general, the Creek area consists of a narrow channel about 5 feet wide which is flanked by a low bank on either side (see Figure 1). The channel and low banks are enclosed by steep banks on either side of the Creek. Because water is likely to have occupied the area nearest the channel most of the time, the majority of the proposed borings will be drilled near

the channel in the pattern shown on Figures 1 and 2. Our field investigation will consist of drilling approximately 60 boreholes and collecting and analyzing of about 180 soil samples. Approximately 20 soil borings will be drilled in the center of the bed itself with the remainder drilled 5 to 20 feet from the channel. Additional boreholes may be drilled if field conditions indicate that additional data is required in a particular area.

Our initial field reconnaissance of the site indicates that the material in the Creek is soil which can be cored. Soil samples will be collected continuously with a split barrel core at each location to the water table which is at approximately 7 feet below grade. All soil samples will be described by a Geraghty & Miller field geologist record sample location, depth, grain size distribution, and color. In addition, each sample will be screened for the presence of volatile organic compounds using a photoionization detection instrument as part of our health and safety protocols.

Although the material in the Creek appears to be "solid", approximately 20 samples chosen by the field geologist will be subjected to the point filter liquids test (USEPA Method 9095) either in the field or laboratory to document that the material is not a liquid. Three core samples from each boring, collected from 0 - 2, 2 to 4 and 4 to 6 feet below grade will be collected for analysis of the "California List" of compounds by the appropriate USEPA method to determine the areal and vertical distribution of chemicals. In addition, approximately 20 samples will be analyzed for reactivity, corrosivity, flammability and EP Toxicity to determine if the material is hazardous according to the RCRA definition. Upon completion of the drilling, each borehole will be sealed will a cement/bentonite grout and the final borehole locations will be surveyed relative to a permanent landmark.

Prior to the start of the field investigation, Geraghty & Miller will develop the necessary work plans including a Quality Assurance Project Plan (QAPP), Field Sampling Plan

(FSP), and Health and Safety Plan (HASP). It should be possible to prepare these documents within 3 weeks after receiving authorization to proceed.

Table 1 provides a cost estimate for preparing the work plans, completing the field investigation and preparing a report detailing the soil boring and analytical program. The estimates in Table 1 assume that the site is accessible to an all terrain vehicle, the work can be done in level C protective equipment and we are not required to hire union personnel. We have also assumed that the field geologist would be supplied by our St. Louis office to minimize travel and expense costs and that Monsanto's ESC would analyze the soil samples.

It will probably be necessary to pump off standing water in the Creek in some areas but we have not had an opportunity to determine costs for this task. Assuming that the water can be pumped to the sewer, and an access point is relatively near, direct pumping is recommended. Alternatively, if a direct discharge is not possible, we could start the boring program and work up to the area where the standing water is located, then transfer the water into the area of the Creek where the boring program has been completed.

If you have any questions or require additional information, please do not hesitate to call.

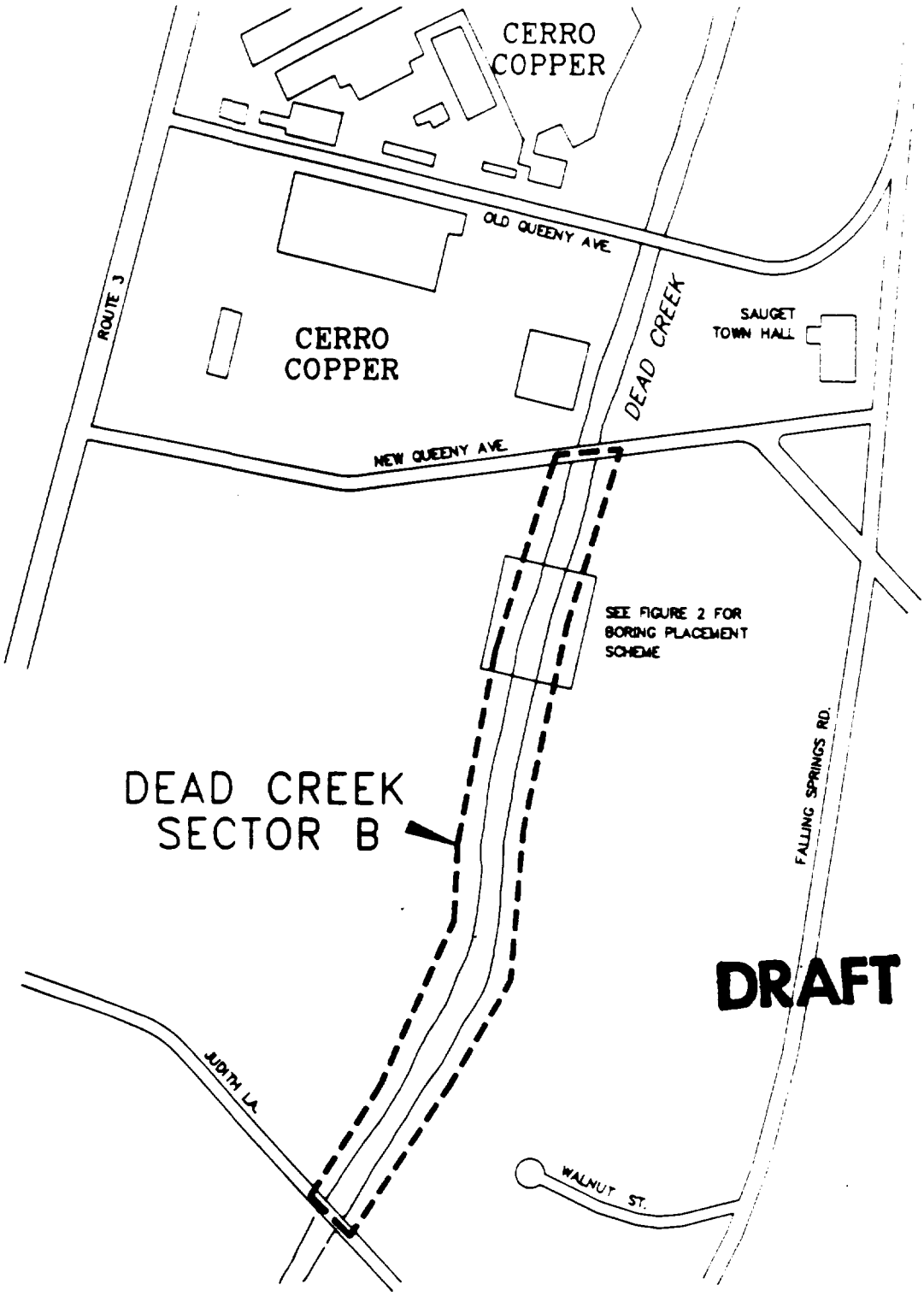
Respectfully submitted,

GERAGHTY & MILLER, INC.

DRAFT

Nicholas Valkenburg
Vice President/Project Officer

NV:th
SMUL0212.LTR



DRAFTER: WH 01010
MGR.: BA BLUM
COMPILER: BA BLUM
CAD FILE: DEAD-BOR
FILE NO.: 1234
PROJ. NO.: 50212NY
DATE: 07FEB90

SCALE
0 500 FT

GERAGHTY & MILLER, INC.
Environmental Services

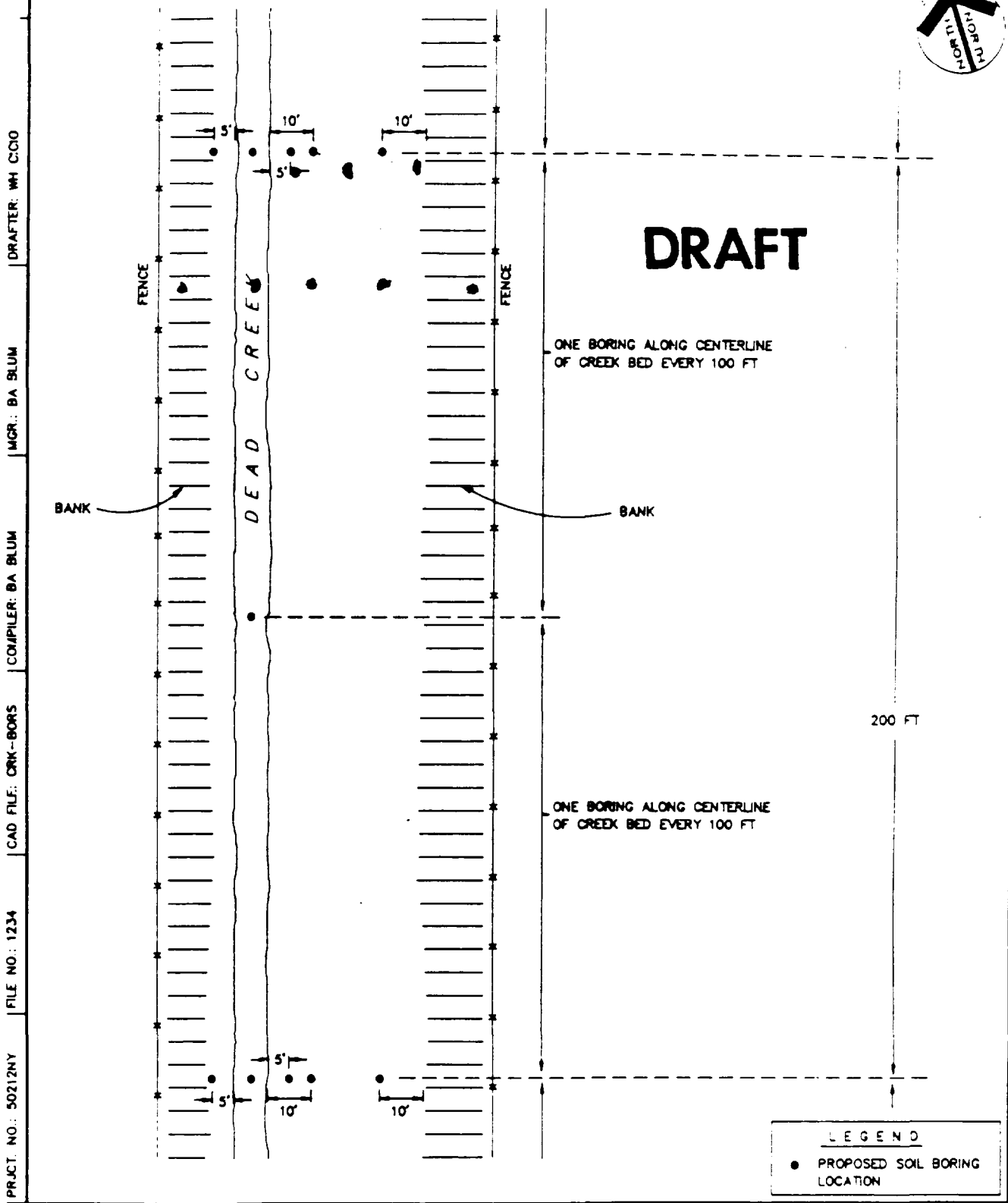
LOCATION OF PROPOSED BORINGS AT DEAD CREEK SECTOR B, SAUGET, ILLINOIS

MONSANTO COMPANY SAUGET, ILLINOIS

FIGURE 1

MCO 7683591

EPA/CERRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE



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CAD FILE: CRK-BORS
FILE NO.: 1234
PRJCT. NO.: 50212NY
DATE: 13FEB90

SCALE
0 30 FT (APPROX.)

GERAGHTY & MILLER, INC.
Environmental Services

SCHEMATIC DIAGRAM OF PROPOSED SOIL BORING LOCATIONS AT DEAD CREEK SECTOR B

MONSANTO COMPANY SAUGET, ILLINOIS

FIGURE 2

MCO 7683592

EPA/CERRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE

DRAFT

Table 1. Estimated Costs for a Soil Boring Program, Monsanto Company, Sauget, Illinois.

TASK 1: DEVELOPMENT OF QAPP, FSP, AND HASP

Geraghty & Miller, Inc. Fees	
Senior Project Advisor 24 hours at $115 per hour	$ 2,760
Senior Scientist I 100 hours at $83 per hour	8,300
Staff Scientist I 100 hours at $65 per hour	6,500
Admin. Support/Clerical 24 hours at $30 per hour	720
Technical Editor 8 hours at $49 per hour	392
Draftsperson 8 hours at $39 per hour	312
Geraghty & Miller, Inc. Expenses	
(reproduction, telephone, facsimile)	500
Total Task 1:	$ 19,484

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TASK 2: FIELD INVESTIGATION AND PROJECT MANAGEMENT

Geraghty & Miller, Inc. Fees

Senior Project Advisor 24 hours at $115 per hour	$ 2,760
Senior Scientist I 40 hours at $83 per hour	3,320
Scientist III 200 hours at $59 per hour	11,800

Geraghty & Miller, Inc. Expenses

Airfare - 1 round trip at $625 per trip	625
Ground Transportation - 1 round trip at $80 per trip	80
Hotel - 1 day at $85 per day	85
Meals - 1 day at $35 per day - 12 days at $5 per day	35 60
Car Rental - 1 day at $75 per day Mileage (Personal Car)	75 315
Supplies: - Miscellaneous (shipping, telephone, facsimilie, safety gear, field supplies)	$ 1,000
Subtotal:	$20,155

Drilling Subcontractor

Mobilization		$ 350
Drilling (Rig, Man power 150 hours x $158/hr		23,700
Materials (cement and bentonite) $5.50 per 47 lb. bag x 100 bags		550
Water Tank and Steam Cleaner $90 per day x 12 days		1,080
Level C Protection $80 per man per day x 2 men x 12 days		1,920
	Subtotal:	$27,600
	5% Service Charge:	$ 1,380
	Subtotal	$28,980

Construction Subcontractor*

Bulldozer (to prepare access) 2 days @ $1500/day)		3,000
Install Gate and repair fence		2,500
	Subtotal:	$ 5,500
	5% Service Charge:	$ 275
	Subtotal	$ 5,775

Task 2 Cost Estimate: $ 54,910

* Note: These estimates are preliminary. More accurate Task 2 Total estimates will be obtained after contacting contractors.

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TASK 3: REPORT PREPARATION

Geraghty & Miller, Inc. Fees

Senior Project Advisor 40 hours at $115 per hour	$ 4,600
Senior Scientist I 80 hours at $83 per hour	$ 6,640
Scientist III 100 hours at $59 per hour	$ 5,900
Draftsman 16 hours at $48 per hour	$ 768
Technical Editor 8 hours at $49 per hour	$ 392
Technician 16 hours at $38 per hour	$ 608
Administrative Support/Clerical 30 hours at $30 per hour	$ 900
Expenses (reproduction, telephone, facsimile)	1,000
Total Task 3:	$ 20,808
PROJECT TOTAL	95,000

SAUGET SITES - DEAD CREEK, SECTOR B

GOAL: Define If A Removal Of Contaminated Sediments To The Chemical Waste Management Landfill At Emelle Is Possible And, If So, Implement Same.

1. IEPA Position Definition

*Contact IEPA (McCombs) and determine approval status of Cerro Removal.
If Negative - Terminate Project
If Positive - Set up meeting with IEPA for Varnado, Smull and McCombs to discuss a similar project. Contact Gilhousen to determine if Enviro. Law wishes to be represented in this and possible future meetings. Also if we should contact the IAG relative to this project and when and how.

*Meet with IEPA, express our concern that the community reaction to a removal on sector A, an industrial area, and no action on sector B, a commercial/residential area, can be expected to be severely negative towards local industries and the Agencies. Additionally it is our perception that there is not a strong technical base on which to defend the situation. Define if IEPA has a positive interest in doing a similar removal on Sector B, if Monsanto would agree to fund and manage the project.

If Negative - Terminate Project
If Positive - Define and Detail Basis in this and future meetings. Major issues are:

a. Access, can IEPA use existing agreement for sampling and removal access.

b. What form of agreement will IEPA require for the work. We need to develop our proposal, letter agreement? or whatever.

c. Regulatory hurdles, PCB content averaging, disposal of dewatering water, etc.

d. Define Agency waste definition analytical requirements (CMW may have additional requirements). At this time we would expect to need PCB, 2,3,7,8 TCDD, landban organics, metals, moisture content. (Also need to define moisture level required to pass paint filter test.

e. Timing. The 11/8/90 landban deadline is a desirable, if not necessary, project completion date.

2. Funding

Prepare EEAR against the Executive Division for $400k to cover funding for study. Issue second EEAR, now anticipated to be in the $10M range for actual removal.

3. Removal Feasibility and Scope Definition

Request G & M to prepare proposal for defining the project, including coring and sampling. Use a fast track basis.

Define laboratory for analytical work including doing same via EASC if necessary to achieve rapid turnarounds.

Define via McCombs ability of plant to provide field supervision of contractors. If not possible, arrange for Engineering or contract support.

Define CMW capability, pricing, and requirements to transport and handle the material at Emelle. At this time the actual removal work would be held out separately as a lump sum bid contract.

4. Community Relations

Meet with MCC and WGK community relations and develop CR plan.

CREEK SECTOR B - DEAD CREEK

Site Description

Creek Sector B (CS-B) includes the portion of Dead Creek lying between Queeny Avenue and Judith Lane in Sauget, Illinois. Three other sites in the Dead Creek Project are located adjacent to CS-B. These include Site G to the northwest, Site L to the northeast, and Site M to the southeast. All of these sites have been identified at one time or another as possible sources of pollution in CS-B. Presently, CS-B and Site M are enclosed by a chain link fence which was installed by the USEPA in 1982. The banks of the creek are heavily vegetated, and debris is scattered throughout the northern one-half of CS-B. Culverts at Queeny Avenue and Judith Lane have been blocked in order to prevent any release of contaminants to the remainder of the creek, although the adequacy of these blocks has been questioned several times. Water levels in the creek vary substantially depending on rainfall, and during extended periods of no precipitation, the creek becomes a dry ditch.

Site History and Previous Investigations

The IEPA initially became aware of environmental problems at CS-B in May, 1980 when several complaints were received concerning smouldering and fires observed the creek bed. In August, 1980, a local resident's dog died, apparently of chemical burns resulting from contact with materials in the ditch. Following this incident, the IEPA conducted preliminary sampling to determine the cause of these problems in CS-B. Chemical analysis of these samples indicated high levels of PCBs, phosphorus, and heavy metals, and the IEPA subsequently authorized the installation of fencing in order to prevent public access to the creek. In September 1980, the Illinois Department of Transportation (IDOT) completed installation of 7000 feet of snow fence with warning signs around CS-B and Site M. The IEPA subsequently performed a preliminary hydrogeological investigation in the area in an attempt to identify the sources of pollution

in Dead Creek. The results of this investigation are documented in the St. John Report. The snow fence was later replaced with a chain link and barbed wire fence. The installation of this fence was authorized by the USEPA, and was completed in October, 1982.

Prior to the IEPA investigation in 1980, the City of Cahokia Health Department received complaints from area residents concerning discharges from Cerro Copper Product (Cerro) entering CS-8. In 1975, IEPA visited the site in order to determine if these discharges were occurring. Investigators observed discoloration in the creek and along the banks similar to what was later observed in the holding ponds at Cerro. One water sample was collected by IEPA from the creek immediately south of Queeny Avenue. Analysis of this sample indicated the presence of copper (0.3 ppm), iron (3.2 ppm), and mercury (0.1 ppb). The culvert under Queeny Avenue was sealed sometime in the early 1970's by Cerro Copper and the Monsanto Chemical Company for the purpose of restricting flow from the holding ponds at Cerro (Creek Sector A). The holding ponds were also regraded to the north to direct their flow to an interceptor discharging to the Sauget Wastewater Treatment Plant. The investigators concluded that flow through the blocked culvert had occurred, although the direction of flow could not be determined because no flow was evident at the time of the inspection.

The IEPA hydrogeological study, conducted in 1980, included collecting 20 surface sediment samples for analysis from CS-8 (Figure B-1). Analyses of samples from the northern portion of CS-8 are presented in Table B-1. Samples x106, x119, x120, x125, and x126 showed PCBs in concentrations ranging from 1.1 to 10,000 parts per million (ppm). Sample x125, taken adjacent to the former Waggoner Company operation, contained additional organic contaminants, including alkylbenzenes (370 ppm), dichlorobenzene (660 ppm), trichlorobenzene (78 ppm), dichlorophenol (170 ppm), and hydrocarbons (21,000 ppm). These contaminants were not detected in other surface sediment samples in the northern portion of CS-8 during this

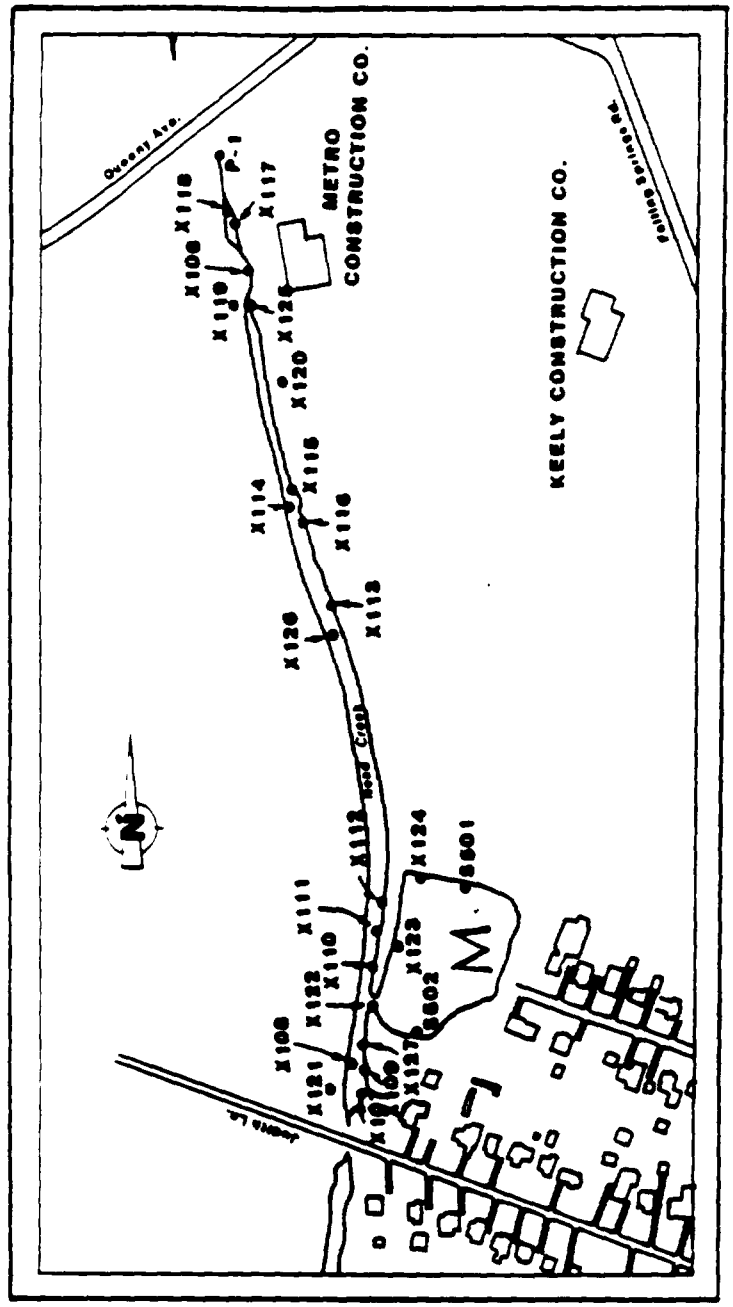


FIGURE B-1
EPA SAMPLING LOCATIONS AT CREEK SECTOR B AND SITE M

MCA C156816

MCO 7683601

TABLE B-1: ANALYSIS OF SOIL SAMPLES IN THE NORTHERN PORTION OF CREEK SECTOR B (COLLECTED BY IEPA 9-8-80 THROUGH 10-25-80)

PARAMETERS	SAMPLE LOCATIONS x106	x113	x114	x115	x116	x117	x118	x119	x120	x125	x126
Aluminum		10,000	6,400	9,000	9,000	1,300	1,200				
Arsenic		300	23	10	9	16	15				
Barium		2,400	1,600	3,400	300	400	1,600	510	1,200	2,500	5,000
Beryllium		-	-	-	-	-	-	1	1	-	2
Boron		-	-	-	-	-	6	-	-	-	76
Cadmium		400	-	120	-	-	-	7	3	6	70
Calcium		11,000	14,000	11,000	5,000	1,600	6,000	7,300	72,000	6,900	19,000
Chromium		250	400	120	130	-	-	36	38	50	100
Cobalt		100	-	40	-	-	-	9	10	9	50
Copper		3,000	4,800	22,000	270	160	1,000	100	150	1,000	44,800
Iron		385,000	55,000	40,000	12,000	2,400	4,300	17,500	16,200	7,000	107,000
Lead		3,600	2,000	3,200	80	-	100	43	60	260	2,000
Magnesium		4,000	2,800	5,000	2,600	1,200	1,000	4,500	4,300	380	3,700
Manganese		120	130	150	60	40	50	260	350	45	280
Mercury		30	1.7	4	0.2	2	2				
Nickel		2,500	1,700	2,400	140	-	-	-	80	130	3,000
Phosphorus										2,000	8,900
Potassium		1,400	1,300	1,500	2,300	850	1,200	1,800	1,200	770	860
Silver			-	-	-	50	-	-	-	-	100
Sodium		2,800	700	1,100	360	150	180	110	225	80	1,400
Strontium		180	140	200	40	-	-	42	140	50	300
Vanadium		-	-	150	-	-	-	27	27	13	85
Zinc		61,000	20,000	71,000	2,500	-	300	2,000	700	1,500	62,000
PCBs	6,200							1.1	80	10,000	350
Alkylbenzenes	-							-	-	370	-
Dichlorobenzene	-							-	-	660	-
Dichlorophenol	-							-	-	170	-
Hydrocarbons	-							-	-	21,000	-
Naphthalenes	-							-	-	650	-
Trichlorobenzene	-							-	-	78	-

NOTE: All results in ppm
Blank indicate parameter not analyzed
- Indicates below detection limits

MCA C156817

MCO 7683602

investigation. In general, inorganic analysis of these samples indicated high levels of several metals in comparison with background conditions (Table B-3, sample x121).

Subsurface soil samples were also collected by IEPA from one location in the northern portion of CS-B during the 1980 investigation. Analyses of samples from boring P-1 are included in Table B-2. Results indicated the presence of PCBs to a depth of seven feet, and other organic contaminants to a depth of three feet. PCB concentrations ranged from 9,200 ppm near the surface to 53 ppm at depths greater than 4 feet and up to 7 feet. Other organic contaminants were detected at concentrations ranging from 12,000 ppm near the surface to 240 ppm at 2.5 feet. These results indicate non-uniform contaminant deposition in the northern portion of CS-B, which is common in riverine systems. The above data indicate that historical release(s) of contaminants to the northern portion of CS-B did occur. However, the horizontal and vertical extent of the resulting contamination has not been fully defined.

Analyses of sediment samples from the southern portion of CS-B are summarized in Table B-3. Sample x121 was taken from soil outside the creek bed to establish background conditions. Samples x107, x122, and x127 contained PCBs at concentrations ranging from 73 to 540 ppm. Sample x122 also showed diclorobenzene (0.35 ppm). This was the only organic contaminant other than PCBs detected in samples from the southern portion of CS-B. Several metals, including arsenic, cadmium, chromium, copper, lead, and zinc, were detected at levels significantly above background concentrations in all samples. However, the metal concentrations were comparable to concentrations detected in samples of sediment taken in the northern portion of CS-B. All of the samples were collected from the creek bed adjacent to, or downstream from Site M, which is an old sand pit excavated by the H.H. Hall Construction Company in approximately 1950. Hazardous materials were not reported to have been disposed of at Site M.

In October, 1980 IEPA and Monsanto Chemical Company cooperatively

TABLE B-2: ANALYSIS OF SUBSURFACE SOIL SAMPLES AT BORING LOCATION P-1 IN CREEK SECTOR B. (COLLECTED BY IEPA 9-8-80)

PARAMETERS	SAMPLE DEPTH						
	0'-1'	1'-2'	2'-3'	3'-4'	4'-5'	5'-6	6'-7'
Biphenyl	6,000	9,000	1,100				
Chloronitrobenzene	200	240					
Dichlorobenzene	12,000	8,900	240				
PCBs	9,200	2,600	92B-6	240	53	53	54
Trichlorobenzene	380	3,700	590				
Xylene	540	250					

NOTE: All results in ppm
Blanks indicate below detection limits

MCA C156819

MCO 7683604

TABLE B-3: ANALYSIS OF SOIL SAMPLES IN THE SOUTHERN PORTION OF CREEK SECTOR B (COLLECTED BY IEPA 9-8-80 THROUGH 10-25-80)

	SAMPLE LOCATIONS								
PARAMETERS	x107	x108	x109	x110	x111	x112	x121	x122	x127
Aluminum		8,000	9,100	7,000	8,000	6,600			
Arsenic	6,000	44	25	67	80	50			
Barium	4,800	3,800	1,600	4,300	1,800	8,000	230	5,500	2,500
Beryllium	-	-	-	-	-	-	-	2	2
Boron	-	-	-	-	-	-	-	-	-
Cadmium	70	-	200	40	100	100	1	35	50
Calcium	11,000	10,000	24,000	16,000	13,000	30,000	11,000	15,000	8,000
Chromium	360	300	-	140	50	50	-	50	340
Cobalt	30	30	20	-	-	30	9	15	30
Copper	32,000	31,000	7,700	22,000	15,000	41,000	100	21,900	28,000
Iron	70,000	58,000	75,000	67,000	68,000	52,000	16,500	50,000	63,000
Lead	24,000	2,000	1,700	2,000	2,000	5,100	-	1,700	1,700
Magnesium	2,900	3,900	3,600	4,100	4,000	4,000	5,900	3,800	2,700
Manganese	150	150	300	200	160	300	370	190	150
Mercury	-	1.7	3	3.3	3.2	6	-	-	-
Nickel	3,500	3,000	900	1,900	2,000	2,700	120	1,700	
Phosphorus	7,040	-	-	-	-	-	-	-	4,700
Potassium	1,200	1,500	1,700	1,300	1,600	1,200	1,500	960	1,000
Silver	40	-	-	-	-	-	-	30	40
Sodium	1,700	900	900	700	1,000	1,600	80	630	700
Strontium	180	200	130	160	160	430	32	190	130
Vanadium	60	-	-	70	100	-	25	45	45
Zinc	25,000	22,000	27,000	25,000	47,000	52,000	230	19,900	28,000
PCBs	120	-	-	-	-	-	-	540	73
Dichlorobenzene	-	-	-	-	-	-	-	0.35	-

NOTE: All results in ppm
Blanks indicate that parameter not analyzed
- Indicates parameter is below detector limit

collected three sediment samples from CS-8 in order to confirm results of earlier sampling done by IEPA. SD-1 was collected from the creek bed 40 yards-south of Queeny Avenue. This location is adjacent to the former Waggoner Company building and also near an old outfall (effluent pipe) from the Midwest Rubber Company. Samples SD-2 and SD-3 were collected approximately 220 yards south of SD-1, in the central portion of CS-8. Results of these samples, including a blank soil sample collected from the Missouri Bottoms in St. Charles, Mo., are presented in Tables B-4 and B-5. PCBs (45-13,000 ppm) were found in all three samples from CS-8, as were several chlorinated benzenes. Chlorinated phenols and phosphate ester were detected in samples SD-1 and SD-3, but were not found in SD-2. The analysis of these samples for inorganic parameters detected generally higher levels of inorganic parameters in SD-2 and SD-3 than those for SD-1 and the soil blank. These results clearly indicate differential contamination in CS-8, with SD-1 showing high levels of PCBs and other organic compounds, whereas SD-2 and SD-3 contained higher levels of metals.

IEPA personnel also collected two sediment samples from CS-8 in December, 1982, as part of an area-wide dioxin sampling effort managed by the USEPA which also included Site O. The first sample was collected along the east bank of the creek, approximately 80 yards south of Queeny Avenue. Previous sampling conducted by IEPA in this area had shown high concentrations of PCBs. The second sample was collected along the west bank of the creek, approximately 50 yards south of Queeny Avenue. Both samples were analyzed specifically for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) by a USEPA contract laboratory. The first sample showed a quantified level (0.54 ppb) of TCDD, and the second sample was below the detection limit.

IEPAs Preliminary Hydrogeological Investigation of Dead Creek in 1980 was conducted for the purpose of determining possible sources of pollution observed in CS-8. The study included installation and

TABLE B-4: ORGANIC ANALYSIS OF SEDIMENT SAMPLES FROM DEAD CREEK, SECTOR B (SPLIT SAMPLES-IEPA AND MONSANTO COLLECTED 10-2-80)

	SAMPLE LOCATIONS			
PARAMETERS	SD-1	SD-2	SD-3	Blank*
CHLOROBENZENES:				
Monochlorobenzene	(0.9)		(0.3)	
p-Dichlorobenzene	370	(0.3)	(0.4)	
o-Dichlorobenzene	80	(0.6)	1	
Trichlorobenzenes	85	1.6	(0.7)	
Tetrachlorobenzenes	6.1	2.4	(0.4)	
Pentacesorobenzene				
Hexachlorobenzene		1.2		
Nitrochlorobenzenes	120			
CHLOROPHENOLS:				
o-Chlorophenol	3.7			
p-Chlorophenol	6.6		(0.9)	
2,4-Dichlorophenol	1.2			
Pentachlorophenol	130		1.8	
PHOSPHATE ESTERS:				
Dibutylphenyl Phosphate	330		(0.8)	
Butyldiphenyl Phosphate			(0.8)	
Triphenyl Phosphate	2600			
2-Ethylhexyldiphenyl Phosphate			2.2	
Isodecyldiphenyl Phosphate				
T-Butylphenyldiphenyl Phosphate	28			
Di-t-butylphenyldiphenyl Phosphate				
Nonylphenyl Diphenyl Phosphate				
Cumylphenyldiphenl Phosphate	3.7			
PCBs (Cl_2 to Cl_6 Homologs)	13,000	240	45	

NOTE: All values in ppm
*Soil blank collected from Missouri Bottoms, St. Charles, Mo.
Blanks indicate below detection limits
( ) Semi-quantitative values

TABLE B-5: INORGANIC ANALYSIS OF SEDIMENT SAMPLES FROM DEAD CREEK, SECTOR B (SPLIT SAMPLES - IEPA AND MONSANTO COLLECTED 10-2-80)

	SAMPLE LOCATIONS			
PARAMETERS	SD-1	SD-2	SD-3	Blank*
Aluminum	1,400	5,100	5,300	5,600
Antimony	13	240	160	29
Arsenic	210	40	55	5
Barium	770	1,200	1,300	130
Beryllium	-	-	-	-
Boron	28	160	100	27
Cadmium	5.1	60	55	3.9
Calcium	8,500	9,200	6,200	4,600
Chromium	25	110	240	19
Cobalt	15	180	120	33
Copper	460	28,000	18,000	19
Iron	4,700	53,000	30,000	9,900
Lead	180	2,000	1,600	50
Magnesium	460	2,200	2,000	2,300
Manganese	29	170	110	510
Molybdenum	6.1	92	68	11
Nickel	110	2,000	1,700	39
Phosphorus	2,500	13,000	9,400	610
Silicon	73	150	89	110
Silver	-	42	29	-
Sodium	400	540	410	320
Strontium	35	230	110	17
Tin	18	260	320	18
Titanium	32	110	80	37
Vanadium	34	140	130	130
Zinc	280	32,000	18,000	56

NOTE: All values in ppm
* Soil blank collected from Missouri Bottoms, St. Charles, MO.
- Indicates below detection limits.

sampling of 12 monitoring wells in addition to the 1980 soil/sediment sampling described above. Residential wells were also sampled to determine ground water quality in the area. Locations of IEPA monitoring wells and residential well samples are shown in Figure B-2. All IEPA wells were screened in the Henry Formation sands, with screened interval elevations ranging between 366 and 402 feet Mean Sea Level. The hydraulic gradient in the vicinity of CS-B is very flat, with ground water flow generally to the west toward the Mississippi River.

Analytical data for three sets of samples from the IEPA monitoring wells, corresponding to three sampling events in 1980 and 1981, are presented in Tables B-6, B-7, and B-8. Well G108 can be considered a background well due to its location upgradient from the known disposal areas around CS-B. Organic contaminants were consistently found in Wells G107 and G112. These wells are in downgradient monitoring positions for sites G and I respectively. Certain organic contaminants were detected in Wells G102, G109 and G110 during the initial sample event, but these wells did not show any of the organics in subsequent samples. Well G102 is located immediately west of the northern portion of CS-B, and near the southeast corner of Site G. Well G109 is located approximately 150 feet west of the former Waggoner surface impoundment (Site L). Well G110 is located downgradient of Site H. PCBs were detected at one time or another in Wells G101, G102, G104, G106, G107, G110, and G112. Of these, only G101 and G102 showed PCBs in all three sets of samples.

Inorganic analyses of samples from the IEPA monitoring wells indicate several parameters at concentrations above background (G108) and water quality standards. Standards for iron, manganese, and phosphorus were exceeded in samples from the background well. Barium, cadmium and lead were detected at concentrations exceeding standards in one or more well(s). In general, wells G109, G110, and G112 showed the most significant inorganic contamination. When compared with data for other wells, G109 contained very high concentrations of arsenic, copper, nickel, and zinc. The pH for G109

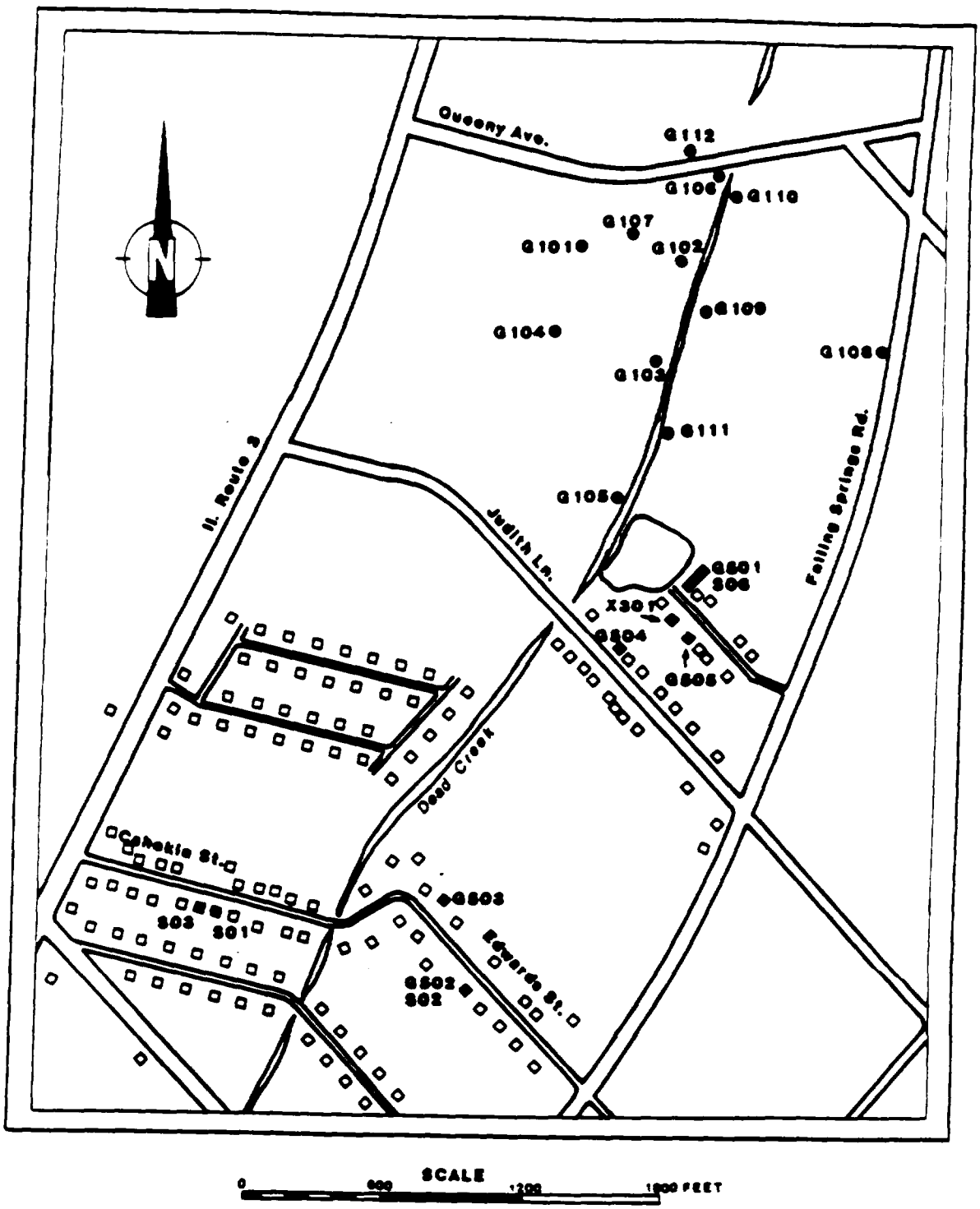


FIGURE B-2
LOCATIONS OF IEPA MONITORING WELLS AND RESIDENTIAL WELLS SAMPLED IN THE VICINITY OF DEAD CREEK

MCA 0156825

MCO 7683610

TABLE 8-6: ANALYSIS OF GROUNDWATER SAMPLES FROM THE IEPA MONITORING WELLS
(COLLECTED 10-23-80)

PARAMETERS	SAMPLE LOCATIONS											
	G101	G102	G103	G104	G105	G106	G107	G108	G109	G110	G111	G112
Alkalinity	382	410	336	406	271	387	552	375	287	210	302	599
Ammonia	0.3	1.0	1.7	0.4	0.9	2.9	0.5	0.3	4.5	1.2	0.1	1.5
Arsenic	0.023	0.023	0.043	0.049	0.067	0.16	0.043	0.008	0.055	0.053	0.008	0.019
Barium	1.3	0.8	2.9	2.2	2.0	0.6	2.1	0.3	0.2	0.5	0.2	0.5
Boron	0.5	0.4	0.5	0.6	0.4	0.5	0.5	0.4	0.4	0.5	0.5	5.6
Cadmium	0.0	0.0	0.03	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.06
Calcium	180	210	210	210	340	185	500	140	380	500	110	242
BOD	237	160	244	206	473	115	1070	298	275	780	79	162
Chloride	48	103	58	52	65	109	132	79	69	61	32	363
Chromium (Total)	0.04	0.02	0.09	0.04	0.12	0.01	0.07	0.0	0.0	0.38	0.0	0.01
Chromium (+6)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Copper	0.46	0.13	1.1	0.31	0.73	0.44	0.68	0.04	0.13	2.3	0.04	1.2
Cyanide												0.0
Fluoride	0.4	0.7	0.7	0.3	1.0	0.7	0.7	0.3	1.2	0.8	0.3	0.5
Hardness	601	804	549	630	520	637	777	496	1664	279	419	1080
Iron	51.0	30.5	86	90	18	62	13	4.1	39.0	340	5	18
Lead	0.10	0.15	0.26	0.2	0.31	0.0	0.27	0.0	0.0	7.3	0.07	0.44
Magnesium	0.09	90	79	72	100	49	205	24	100	209	24	82.5
Manganese	5.1	3.8	4.2	3.4	4.2	1.9	9.8	0.98	4.5	8.0	1.1	3.9
Mercury	0.0	0.0	0.0002	0.0	0.0	0.0	0.0	0.0001	0.0	0.0	0.0	0.0001
Nickel	0.1	0.1	0.9	0.1	0.0	0.1	0.3	0.0	0.5	1.9	0.0	0.3
Nitrate-Nitrite	0.1	0.1	0.1	0.4	0.0	0.1	0.1	1.1	0.0	0.4	0.5	0.0
pH	6.6	6.6	6.5	6.6	6.6	6.5	6.4	6.6	6.3	6.7	7.0	6.4
Phenolics	0.0	.01	0.0	0.005	0.0	0.065	2.5	0.01	0.45	0.015	0.0	0.875
Phosphorus	2.9	1.2	3.3	2.7	6.8	1.8	9.4	.18	.72	16	.24	.69
Potassium	10.6	13.1	13.4	12.3	22	7.7	15.2	13.7	14.9	29	4.9	58
R.O.E.	650	1230	765	790	824	1020	1230	704	2460	508	512	2130
Selenium	0.003	0.001	0.004	0.01	0.008	0.001	0.004	0.001	0.001	0.005	0.002	0.001
Silver	0.01	0.0	0.2	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.02	0.11
Sodium	24	60	40	29	57	96		40	40	53	24	260
S.C.	870	1500	1050	1000	1040	1340	1430	900	2470	720	490	
Sulfate	132	434	230	204	296	201	201	103	1340	93	104	518
Z	0.6	0.4	6.2	0.3	3.7	0.1	0.0	0.0	0.1	8.0	0.0	7.8
PCB (ppb)	1.0	1.2	-	-	-	-	-	-	-	2.7	-	-
Chlorophenol (ppb)	-	1200	-	-	-	-	630	-	19	-	-	-
Chlorobenzene (ppb)	-	-	-	-	-	-	19	-	-	-	-	100
Dichlorobenzene (ppb)	-	-	-	-	-	-	25	-	-	-	-	65
Dichlorophenol (ppb)	-	-	-	-	-	-	890	-	-	-	-	-
Cyclohexanone (ppb)	-	-	-	-	-	-	-	-	120	5.9	-	-
Chloroaniline (ppb)	-	-	-	-	-	-	-	-	-	-	-	3500

NOTE: All results in ppm unless otherwise noted.
Blanks indicate parameter not analyzed.
\- indicates below detection limits.

MCO 7683611

MCA J156826

TABLE 8-7: ANALYSIS OF GROUNDWATER SAMPLES FROM THE IEPA MONITORING WELLS
(COLLECTED 1-28-81)

SAMPLE LOCATIONS

PARAMETERS	G101	G102	G103	G104	G105	G106	G107	G108	G109	G110	G111	G112
Alkalinity	447	421	266	520	363	556	621	448	18	308	394	619
Ammonia	0.3	0.0	1.4	0.2	0.7	3.3	1.0	0.0	17	0.2	0.1	0.5
Arsenic	0.015	0.016	0.018	0.002	0.037	0.11	0.021	0.004	7.5	0.013	0.014	0.027
Barium	0.9	1.2	0.9	0.3	1.0	1.0	3.2	0.5	0.2	1.0	0.7	0.5
Boron	0.3	0.4	0.4	0.7	0.4	0.6	0.5	0.2	0.8	0.2	0.6	0.9
Cadmium	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00
Calcium	220.0	320.9	176.3	218.0	319.2	225.5	1169.5	205.5	466.7	169.4	181.4	198.3
C.O.D.	45	93	56	9	143	212	635	8	1315	37	28	47
Chloride	20	120	64	29	59	156	201	76	32	36	18	210
Chromium (Total)	0.02	0.02	0.02	0.00	0.03	0.00	0.09	0.00	0.04	0.02	0.02	0.00
Copper	0.69	0.79	0.36	0.14	0.43	0.29	0.97	0.00	94.1	0.11	0.04	0.28
Cyanide	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Hardness	554	1072	490	717	764	617	960	564	2144	447	530	406
Iron	30.4	16.5	20.8	1.4	60.8	67.5	172	0.3	198	19.1	10.1	18.9
Lead	0.17	0.08	0.00	0.00	0.07	0.00	0.32	0.00	0.00	0.00	0.00	0.00
Magnesium	48.2	78.0	46.3	49.1	73.6	49.1	288.1	34.3	184.4	43.5	37.9	54.0
Manganese	3.82	3.15	3.07	1.41	4.10	2.13	9.64	0.34	8.30	0.77	1.76	2.78
Mercury	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0004	0.0	0.0	0.0
Nickel	0.1	0.1	0.4	0.0	0.2	0.0	0.5	0.0	176	0.9	0.0	0.0
Nitrate-Nitrite	0.0	2.5	0.1	0.5	0.0	0.0	0.2	3.5	0.3	18	0.5	0.0
pH	7.0	7.0	7.1	7.2	7.0	6.9	6.9	7.1	4.1	6.9	7.0	6.9
Phenolics	0.0	0.0	0.0	0.0	0.0	1.46	0.5	0.01	1.86	0.02	0.015	0.05
Phosphorus	0.91	0.88	0.41	0.06	3.6	2.1	10	0.03	3.7	1.0	0.51	0.53
Potassium	6.4	12	8.0	6.0	13	6.2	20	16	18	7.5	4.2	20
Selenium	0.002	0.002	0.002	0.002	0.003	0.002	0.011	0.004	0.006	0.016	0.002	0.0
Silver	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sodium	13	63	40	15	50	94	60	30	37	13	14	18
Sulfate	129	583	256	265	460	143	276	86	3371	57	153	212
Zinc	0.3	1.2	1.8	0.1	1.5	0.1	1.5	0.0	10.1	2.0	0.1	2.8
PCB (ppb)	0.22	3.9	-	0.3	-	-	0.4	-	-	-	-	-
Chlorobenzene (ppb)							6.3	-	-			2.5
Dichlorophenol (ppb)							560	-	-			-
Chloroaniline (ppb)							90	-	-			2.1

NOTE: All results in ppm unless otherwise noted.
Blanks indicate parameter not analyzed.
- indicates below detection limits.

MCA 156627

MCO 7683612

TABLE 8-8: ANALYSIS OF GROUNDWATER SAMPLES FROM THE IEPA MONITORING WELLS
(COLLECTED 3-10-81 - 3-11-81)

SAMPLE LOCATIONS

PARAMETERS	6101	6102	6103	6104	6105	6106	6107	6108	6109	6110	6111	6112
Alkalinity	483	484	319	548	393	594	657	484	58	331	387	400
Ammonia	0.2	0.0	1.6	0.0	0.4	3.0	0.2	0.0	15	0.0	0.1	0.7
Arsenic	0.001	0.0	0.003	0.001	0.013	0.005	0.004	0.001	3.9	0.001	0.001	0.00
Barium	0.0	0.7	0.1	0.2	0.2	0.3	0.1	0.2	0.1	0.1	0.1	0.0
Boron	0.2	0.4	0.3	0.7	0.3	0.5	0.5	0.2	0.5	0.1	0.4	3.4
Cadmium	0.0	0.01	0.01	0.0	0.0	0.0	0.01	0.0	0.07	1.1	0.0	0.17
Calcium	154	333	161	206	218	175	188	148	431	121	164	207
BOD	10	24	47	9	23	146	47	12	930	10	9	52
Chloride	16	124	46	28	57	150	235	51	24	27	16	133
Chromium (Total)	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0
Copper	0.04	0.06	0.08	0.02	0.02	0.01	0.01	0.03	67	0.02	0.07	0.48
Cyanide	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hardness	542	1062	620	.839	796	675	1096	479	1651	424	485	789
Iron	0.3	0.3	1.6	0.0	9.4	4.9	2.4	0.0	1.4	0.0	0.2	0.5
Lead	0.0	0.0	0.0	0.0	0.0	0.06	0.0	0.0	0.0	0.0	0.07	0.0
Magnesium	34.2	77.9	41.9	56.8	47	44.8	44.8	22.3	138	28.7	31.8	72
Manganese	2.0	2.98	3.51	0.61	2.32	1.82	2.12	0.23	6.22	0.14	1.02	2.1
Mercury	-	-	-	-	-	-	0.0002	-	0.0003	-	-	-
Nickel	0.0	0.3	1.1	0.0	0.2	0.0	0.0	0.1	123	1.2	0.0	0.4
Nitrate-Nitrite	0.0	1.1	0.0	2.3	0.0	0.0	0.0	0.3	0.3	15	2.7	0.2
pH	6.9	6.8	6.8	6.9	6.8	6.7	6.7	7.0	4.6	6.6	6.8	6.6
Phenolics	0.0	0.0	0.006	0.0	0.0	0.0	1.7	0.1	1.4	0.0	0.0	0.00
Phosphorus	0.0	0.08	0.03	0.02	0.1	1.5	0.03	0.02	2.2	0.01	0.01	0.03
Potassium	4.0	10.8	10.4	5.9	8.9	5.7	2.8	18.2	6.4	6.3	2.9	40.2
Selenium	0.0	0.0	0.001	0.003	0.0	0.0	0.0	0.001	0.003	0.018	0.001	0.0
Silver	0.01	0.02	0.0	0.0	0.02	0.01	0.01	0.0	0.0	0.01	0.01	0.01
Sodium	11	64	65.6	17.4	51.2	92.6	39.2	25.2	12.1	14.2	15.5	96.6
Sulfate	118	617	471	303	466	146	313	55	2629	61	147	544
Zinc	0.1	0.0	2.8	0.1	0.3	0.1	0.1	0.3	6.3	1.8	0.1	11.8
PCB (ppb)	0.13	0.46	-	0.1	-	2.4	0.37	-	-	0.9	-	2.0

NOTE: All results in ppm unless otherwise noted.
Blanks indicate parameter not analyzed.
- indictes below detection limits.

MCA ?156828

MCO 7683613

was 6.3, 4.1, and 4.6 during the three sampling events. This indicates an unidentified source was releasing acid to the groundwater. Other wells which exhibited significant inorganic contamination include G102, G103, G105, and G106, all of which are located adjacent to CS-8 along the west side. The data indicates non-uniform ground water contamination in the area, likely resulting from a variety of pollutional sources.

Private wells in the area have been periodically sampled by the IEPA and the USEPA. These wells are no longer used for potable water, but they are used for watering lawns and gardens. Locations of private well samples in the Dead Creek area are shown in Figure 8-2. IEPA sampled five residential wells and collected one basement seepage sample near Creek Sectors B and C. Analytical data for these samples are presented in Table 8-9. G504, located east of CS-8 on Judith Lane, exceeded the standard for copper. The wells all showed water quality similar to that found in IEPA monitoring well G108, indicative of background conditions in the area. The basement seepage sample was collected from a residence on Walnut Street, just east of Site M. Analysis of this sample indicated higher levels of barium and copper, when compared with the private well samples. The seepage sample (x301) also showed a measurable level of chlordane, which was likely due to the application of commercial pesticides.

In March, 1982 the USEPA collected ground water samples from four private wells (S01, S02, S03, and S06) and two IEPA monitoring wells (S04 and S05). Ground water samples S04 and S05 correspond to IEPA monitoring wells G102 and G101 respectively. In addition, soil samples (S07 S10, S11) were collected from three gardens where well water is used for watering. Soil Samples S07, S010, and S011 were collected from gardens at the locations of ground water samples S01, S02, and S03 respectively (see Figure 8-2 for approximate sample locations). Water and soil blank samples, R09 and R12 respectively, were also collected and analyzed. Analytical data for these samples are presented in Tables 8-10 and 8-11.

TABLE B-9: ANALYSIS OF RESIDENTIAL WELL AND SEEPAGE SAMPLES COLLECTED BY IEPA

	SAMPLE DATES AND LOCATIONS					
PARAMETERS	9/16/80 G501	9/16/80 G502	9/16/80 G503	9/23/80 G504	6/8/83 G505	1/5/83 x301
Arsenic	0.008	0.004	0.001		0.01	0.07
Barium	0.2	0.16	0.39	0.05	0.4	1.1
Boron	0.28	0.27	0.25	0.58	0.4	0.3
Cadmium						
Chromium						
Copper	0.02			0.06	0.01	0.03
Iron	4.6	19	17.7	0.73	26	31
Lead						0.03
Magnesium	33	39	36	30	35.3	54
Manganese	1.02	1.26	0.79	0.65	1.3	1.49
Mercury				0.0001		
Nickel				0.02		0.1
Phosphorus				0.02	0.62	1.2
Potassium	6.6	5.7	4.5	6	6.2	6.4
Silver						
Sodium	21	24	12	26	15.2	19
Zinc	0.85		0.18	0.8		0.7
PCBs	-	-	-			
Chlordane (ppb)	-	-	-	-		0.13

NOTE: All results in ppm unless otherwise noted
Blanks indicate below detection limit
- Indicates parameter not analyzed
Sample x301 was collected from basement seepage

MCA 0156830

MCO 7683615

TABLE B-10: ANALYSIS OF IDENTIFIED ORGANICS IN GROUND WATER AND SOIL SAMPLES IN THE VICINITY OF CREEK SECTOR B (COLLECTED BY USEPA 3-3-82)

	SAMPLE LOCATION										
	Ground Water							Soil			
PARAMETERS	S01	S02	S03	S04	S05	S06	R09	S07	S010	S011	R012
bis(2-ethylhexyl) phthalate	64	62			19	a				a	0.44
di-n-butyl phthalate	a	a	a	a	11	a				a	a
diethyl phthalate	a	a	a	a			a				
3,4 benzofluoranthene	a										
benzo(k) fluoranthene	a										
butyl benzylphthalate				a			a				
methylene chloride	16	16	2300	3100	990	2000	19	1	0.1		0.75
1,2-dichlorobenzene				a							
1,4-dichlorobenzene				a							
chlorobenzene				a	a						
heptachior				0.11b	0.146						
beta-BHC				0.18b	0.3b	4.04b					
gamma-BHC				0.16b	0.25b						
alpha-BHC					0.18b	0.25b					
aldrin				0.17b							
dieldrin								0.012		0.0046	
chlordane									0.11b		
heptachlorepoxide						1.46b					
delta-BHC						0.95b					
fluoranthene							a			a	
benzo(a) anthracene							a			a	
anthracene							a				
pyrene							a			a	
Chrysene										a	0.02b

NOTE: All results in ppb
Blanks indicate below detection limit
a - Compound detected at value below specified contract detection limit (compound identified as present, but not quantified)
b- value not confirmed by GCMS
Samples R09 and R012 are water and soil blanks, respectively

TABLE B-11: INORGANIC ANALYSIS OF GROUND WATER AND SOIL SAMPLES IN THE VICINITY OF CREEK SECTION B (COLLECTED BY USEPA 3-3-82)

PARAMETERS	SAMPLE LOCATIONS													
	GROUND WATER - in PPB						SOIL IN PPM							
	S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11	A012		
Aluminum														
Antimony														
Arsenic	11			29			1.3	1.0						
Barium							80	80						
Beryllium														
Boron	10,500	11,000	8,000	1,800	140	110								
Cadmium	4.2	14	31	5.3		2.8	1.06	1.04	0.29					
Chromium	12						2.2							
Cobalt	62	70	82	95										
Copper	66						16	24	13					
Iron	65,000	31,000	30,000	28,000	530	250	340	360	240					
Lead	570	97	74	9	11	10	(45)	(20)	(25)					
Manganese	1,000	1,100	1,500	5,100	480	80	120	630	134					
Mercury														
Mercury*	0.1	0.4	0.4	0.2	0.1									
Nickel														
Selenium							6.5	5.5	4					
Silver														
Thallium														
Tin														
Vanadium									2					
Zinc	107,000	109,000	40,000	1,900	260	350	96	77	130					

NOTE: Blanks indicate below detection limits
( ) - Results did not meet USEPA Quality Control criteria - Data unreliable
* Duplicate analysis performed by USEPA central regional laboratory
Samples A09 and A012 are water and soil blanks, respectively

MCA 0156832

MCO 7683617

Quantified levels of bis-(2-ethylhexyl) phthalate were found in wells S01, S02, and S05. In addition, seven compounds from the pesticide fraction were detected in Wells S04, S05 (IEPA wells), and S06. Diethyl phthalate, butyl benzylphthalate, and methylene chloride were detected in the water blank, indicating that values of these parameters found in other samples should be disregarded. Methylene chloride was used to decontaminate sampling equipment, and concentrations of this parameter in all samples should not be considered indicative of aquifer conditions. Water quality standards for lead and cadmium were exceeded in one or more wells.

The soil samples showed trace levels of chlordane and dieldrin. It could not be determined if levels of pesticides found in the gardens soils were attributable to the use of well water or application of commercial pesticide products to the gardens. Phthalates, methylene chloride, chrysene, and chromium were detected in the soil blank (R012), and these compounds should be disregarded in other samples.

In September and October, 1980 IEPA conducted preliminary air monitoring in CS-B. The survey included use of detector tubes (Drager) for halogenated hydrocarbons, and collection of air samples in charcoal tubes with subsequent laboratory analysis. The detector tubes showed positive readings for hydrocarbons in the northern portion of CS-B, adjacent to the former Waggoner Building. Results were not quantified, and negative readings were observed in all other areas surveyed. Air samples were collected from two locations in CS-B using charcoal tubes and sampling pumps. Two samples were collected from each location in order to monitor conditions for undisturbed and disturbed soil. Samples from the first location, 40 yards south of Queeny Avenue, showed no positive readings for volatile organic compounds (VOCs) for disturbed or undisturbed soil conditions. Xylene was detected for disturbed and undisturbed soil conditions at the second sampling location, which was 60 yards north of Judith Lane, adjacent to Site M. All samples were extracted and analyzed at IEPAs Springfield Laboratory.

A USEPA Field Investigation Team (FIT) contractor also performed an air monitoring survey in the creek bed in March, 1982. This survey involved the use of an organic vapor analyzer (OVA), an HNU photoionizer, and Drager detector tubes for phosgene gas. Results indicated that a small, but measurable, concentration of organic vapors were present in the breathing zone (5 feet above ground surface), with concentrations increasing closer to the creek bed. In the breathing zone, the OVA showed readings up to 0.5 ppm above background, and the HNU readings were as high as 9 ppm above background. The survey crew also observed a 3-inch effluent pipeline adjacent to the former Waggoner Building which was discharging a small stream of oily liquid. OVA and HNU readings were taken approximately 6 inches from the surface where this liquid had pooled. The OVA showed concentrations up to 350 ppm, and the HNU showed concentrations ranging from 400 to 900 ppm in this area. Phosgene gas was not detected in any area using the Drager tubes.

HRS scores have been calculated on two separate occasions for Dead Creek. The creek was first scored in July, 1982, by Ecology & Environment, Inc., with a final migration score of 18.48. The site was again scored in March, 1985 by IEPA in an attempt to increase the previous score. IEPAs assessment led to a final score of 29.23, however, this score has not been finalized by USEPA. Route scores for the 1982 assessment were as follows: ground water 4.24, surface water 7.55, and air 30.77. Corresponding route scores in the 1985 assessment were 5.65, 10.07, and 49.23. Observed releases were used for all route scores in both the 1982 and the 1985 scoring packages. The only difference in the assessments was in the value assigned for waste quantity in the three routes. The 1982 package listed waste quantity as unknown (assigned value - 0), while IEPA calculated an approximate volume of waste based on sample results and visual observations.

A significant amount of data has been developed showing a wide range of contaminants in and around CS-8. Review of existing file data indicates numerous possible sources of contamination in the area.

Prior to blocking the culvert at Queeny Avenue, Cerro Copper and Monsanto Chemical reportedly discharged process wastes directly into the creek. According to past IEPA inspection reports the former Waggoner Company, an industrial waste hauling operation, discharged wash waters from truck cleaning activities directly to CS-B. After IEPA order Waggoner to cease this practice, an unlined surface impoundment was apparently used for disposal of wash water. In the 1940s and 1950s sites H and I were used for disposal of various industrial wastes. These sites were actually a single, large disposal area prior to the construction of Queeny Avenue in the late 1940s. In the 1950s, the Midwest Rubber Company, located west of State Route 50 and south of Queeny Avenue, had an effluent pipeline which ran from their plant location to the northern portion of CS-B. Midwest Rubber Co. reportedly discharged process wastes, including oils and cooling water, to the creek. Site G is a surface/subsurface disposal area with corroded drums and other wastes exposed on the surface. Surface drainage for at least a portion of this site is directed to CS-B.

Data Assessment and Recommendations

The scope of field investigation work for CS-B during the Dead Creek Project includes collecting three surface water samples from the Creek in Sector B. This sampling program should be sufficient to characterize the water currently in the creek. Soil gas and ambient air monitoring will also be done in and around CS-B.

Although a great deal of data is available for CS-B, most of the data is 4-6 years old. Because of the dynamic nature of the creek and disposal activities in the area, existing conditions may not be accurately characterized by historical sampling data. Feasibility study activities for CS-B could be accomplished using existing data and applying assumptions concerning chemical profiles (contaminant distribution). However, to properly accomplish the feasibility study activities, a current chemical depth profile of the creek bed should be developed. This would consist of collecting

sediment and subsurface soil samples from several locations in the creek bed and along the banks. The hydrology of the area has not been well-defined and should be addressed further. It has not been established whether the ground water discharges to Dead Creek or the creek acts as a recharge conduit for the Henry Formation aquifer. If discharge to the creek is occurring, the subsurface disposal areas (Sites H and I in particular) may be major contributors to the contamination of the creek.

Accordingly, existing IEPA monitoring wells on both sides of the creek should be redeveloped to allow for accurate water level measurements. This, in conjunction with detailed surveying of the creek bed and water levels in the creek, would allow adequate assessment of the hydrology in the area. This would be best accomplished using continuous-recording water level instrumentation, and should be continued over a period of time sufficient to address seasonal fluctuations. In addition, records of industries in the area should be thoroughly reviewed to establish a profile of possible releases from each source.

SITE M. HALL CONSTRUCTION PIT

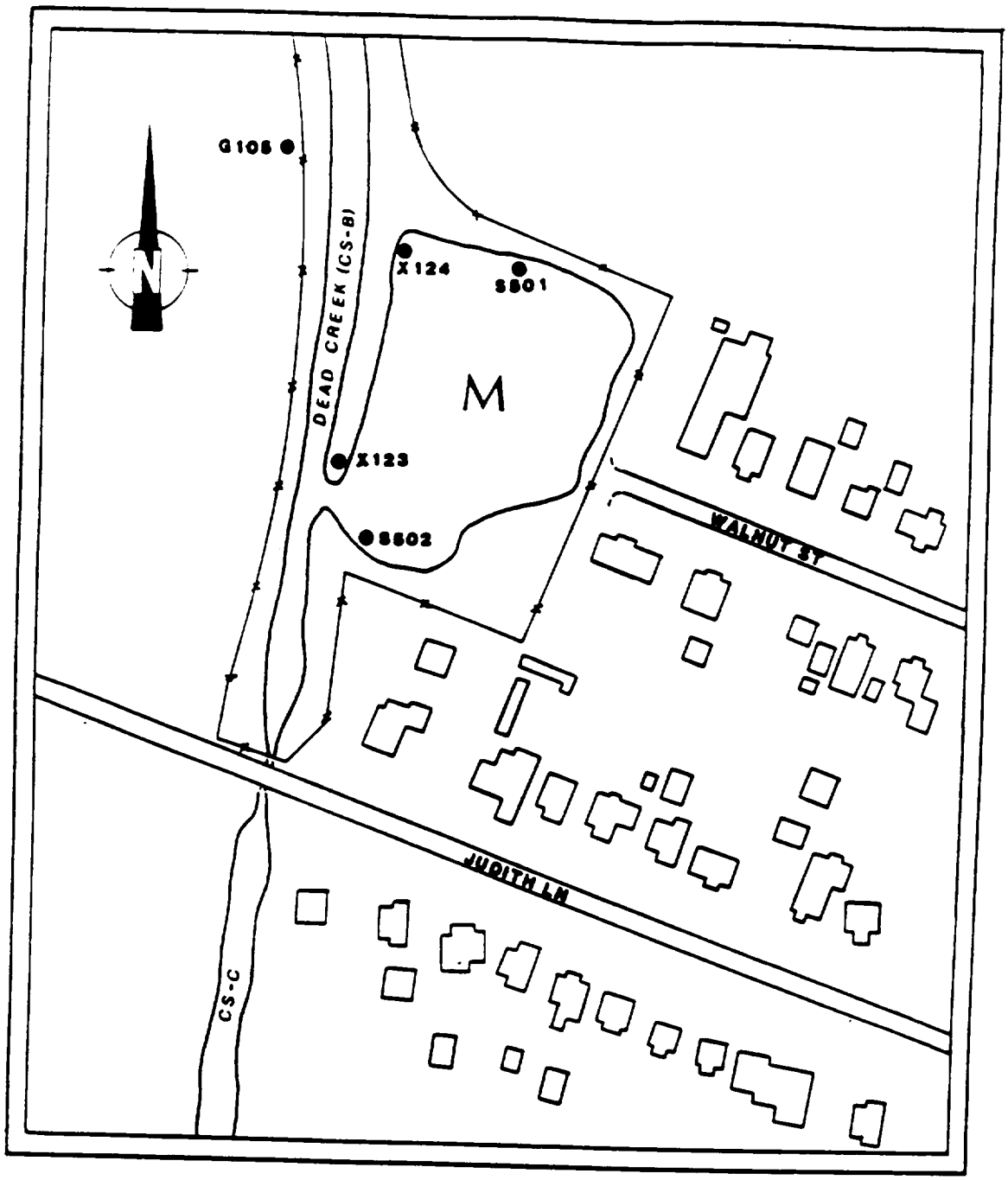
Site Description

Site M is a sand pit excavated by the H.H. Hall Construction Company in the mid to late 1940's. The pit is located immediately east of Dead Creek, and approximately 300 feet north of Judith Lane in Cahokia, Illinois (Figure M-1). The dimensions of the pit are approximately 275 by 350 feet. Presently, Site M is enclosed by a chain link fence, which also surrounds Creek Sector B. A small residential area is located just east of the pit on Walnut Street, which earlier served as an access road to Site M. The pit was excavated prior to any residential development on this street. Observations suggest that the pit is apparently isolated from Dead Creek by an embankment; however, this embankment may not be continuous. Aerial photographs indicate that a small break in the southern part of the embankment may allow flow between the creek and Site M. This possibility is supported by past IEPA inspections indicating discoloration in the pit similar to that observed in Dead Creek.

Site History and Previous Investigations

No information is available on file concerning waste disposal activities at Site M. It is possible that disposal did occur, since access to the pit remained unrestricted until a snow fence was erected in 1980. From review of historical aerial photographs, it is evident that minor changes in the dimensions of the pit have occurred. This could be an indication of filling around the perimeter of the pit. IEPA and the Cahokia Health Department have received numerous complaints about Site M and the creek from residents in the area. These complaints address, for the most part, seepage of odoriferous water into basements and problems associated with well water used to water gardens and lawns.

IEPA sampled several private wells in the area during the preliminary



LEGEND

G105	IEPA MONITORING WELL
X124	IEPA SEDIMENT SAMPLING LOCATION
S502	IEPA SURFACE WATER SAMPLING LOCATION

FIGURE M-1
DEAD CREEK SITE AREA M WITH SAMPLING LOCATIONS

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hydrogeological study conducted in 1980. In addition, one sample of basement seepage from a home on Walnut Street near Site M was collected. Analytical results of these samples are presented in Table B-9, located in the Creek Sector B portion of the report. The results show concentrations of copper, manganese, and phosphorus above the state's water quality standards in one or more wells as well as in the basement seepage sample.

In conjunction with the creek sampling done in 1980, IEPA collected sediment and water samples from Site M. Analytical data for these samples are presented in Table M-1. In general, the water samples showed no significant contamination, although water quality standards for copper, phosphorous, and zinc were exceeded. Trace levels of PCBs (0.9 to 4.4 ppb) were found in both samples. The sediment samples, however, did show fairly high levels of several contaminants, including cadmium, chromium, copper, lead, nickel, zinc, and PCBs. In general, the samples closer to the break in the embankment separating Site M from Dead Creek showed higher levels of contaminants than the other samples.

Because water levels in the pit were approximately two feet higher than those found in the closest monitoring wells, the IEPA study concluded that there is no hydrological connection between water in the pit and the ground water aquifer. This assessment may or may not be accurate.

Data Assessments and Recommendations

The IEPA study conducted in 1980 showed significant contamination at Site M and identified specific waste types present. Investigation of Site M for the Dead Creek Project includes collecting two surface water and three sediment samples. A soil gas survey and ambient air monitoring will also be conducted at Site M. This sampling program will not provide sufficient data to adequately evaluate remedial alternatives. Core samples should be collected from the bottom of the pit in order to determine the types of wastes present and the

TABLE M-1:

ANALYSIS OF SURFACE WATER AND SEDIMENT SAMPLES FROM SITE M
(COLLECTED BY IEPA 9-15-80)

	SAMPLE LOCATIONS			
	Water		Sediment	
PARAMETERS	S 501	S 502	X 123	X 124
Alkalinity	80	85		
Arsenic	0.006	0.01		
Barium	0.2	0.5	4,400	350
Berylium			3	1
BOD-5	4	33		
Boron	0.2	0.2	-	25
Cadmium	-	-	40	4
Calcium			12,500	4,500
COD	58	85		
Chloride	27	28		
Chromium	-	-	150	50
Copper	0.035	0.33	18,700	4,500
Cyanide	0.02	-		
Flouride	0.4	0.4		
Iron	0.8	1.8	49,000	13,500
Lead	-	0.01	1,400	130
Magnesium	6	6	3,400	3,500
Manganese	0.06	0.82	200	80
Mercury	-	-		
Nickel	0.02	0.05	1,600	590
Phenol	0.01	0.01		
Phosphorus	0.17	0.31		
Potassium	5.9	6.2	950	1,000
Silver	-	-	30	6
Sodium	24	25	650	100
Strontium			175	27
Vanadium			42	19
Zinc	0.1	0.7	17,700	2,600
PCBs	0.0009	0.0044	1,100	24
Dichlorobenzene				

NOTE: All results in ppm.
Blanks indicate parameter not analyzed.
- Indicates below detection limits.

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extent of vertical migration of contaminants that has occurred. In addition, several borings should be completed around the perimeter of the pit, including the embankment between the pit and the creek. It would also be necessary to verify that there is no hydrological connection between the water in the pit and the ground water aquifer. This would be best accomplished using continuous recording gauging stations at wells in the vicinity of the creek and at the pit. These activities would provide the information necessary to proceed with a viable remedial program.